Fig. 1

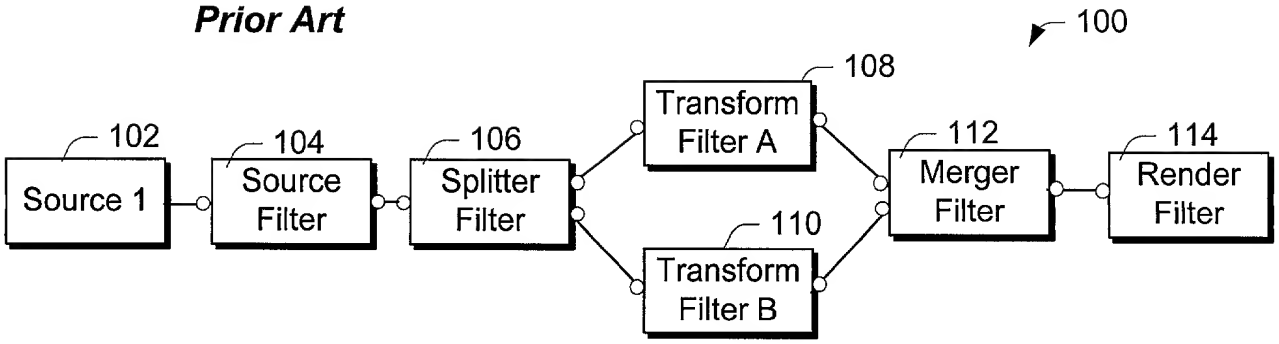
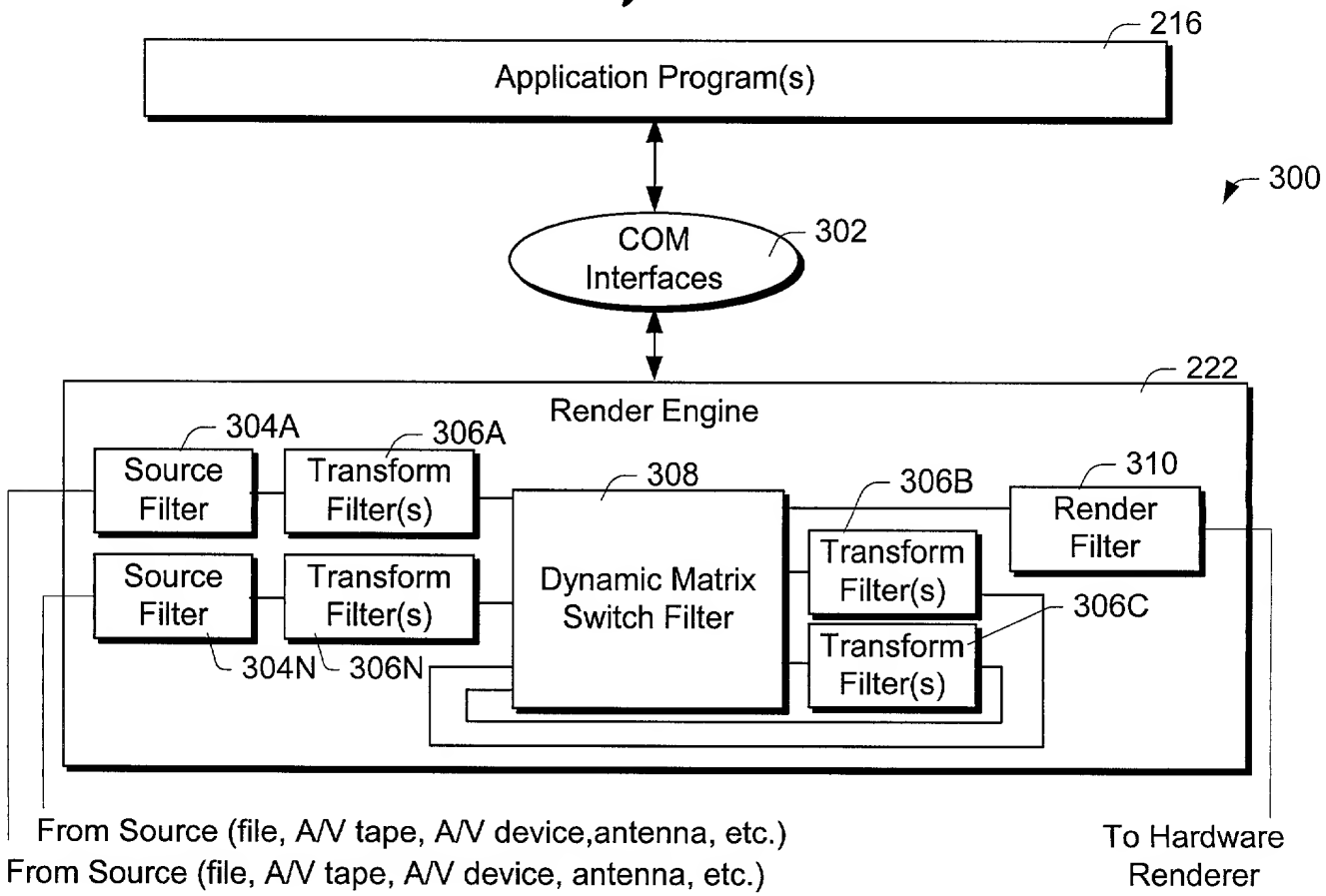

Prior Art
100
102
Source 1
104
Source Filter
106
Splitter Filter
108
Transform Filter A
110
Transform Filter B
112
Merger Filter
114
Render Filter

Fig. 3


216
Application Program(s)
300
COM Interfaces
302
222
Render Engine
304A
Source Filter
306A
Transform Filter(s)
Source Filter
Transform Filter(s)
304N
306N
308
Dynamic Matrix Switch Filter
306B
Transform Filter(s)
Transform Filter(s)
306C
310
Render Filter
From Source (file, A/V tape, A/V device,antenna, etc.)
From Source (file, A/V tape, A/V device, antenna, etc.)
To Hardware Renderer

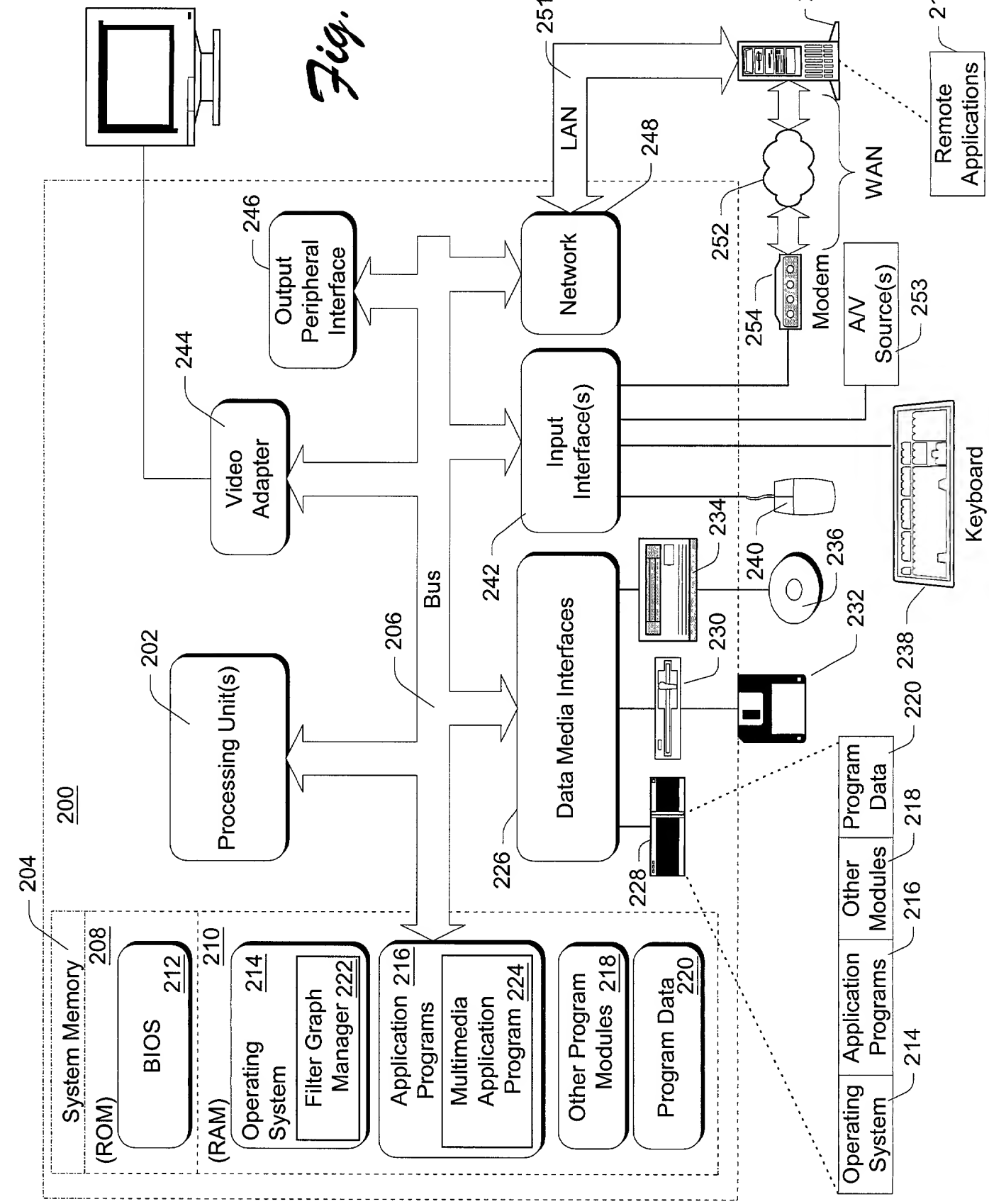
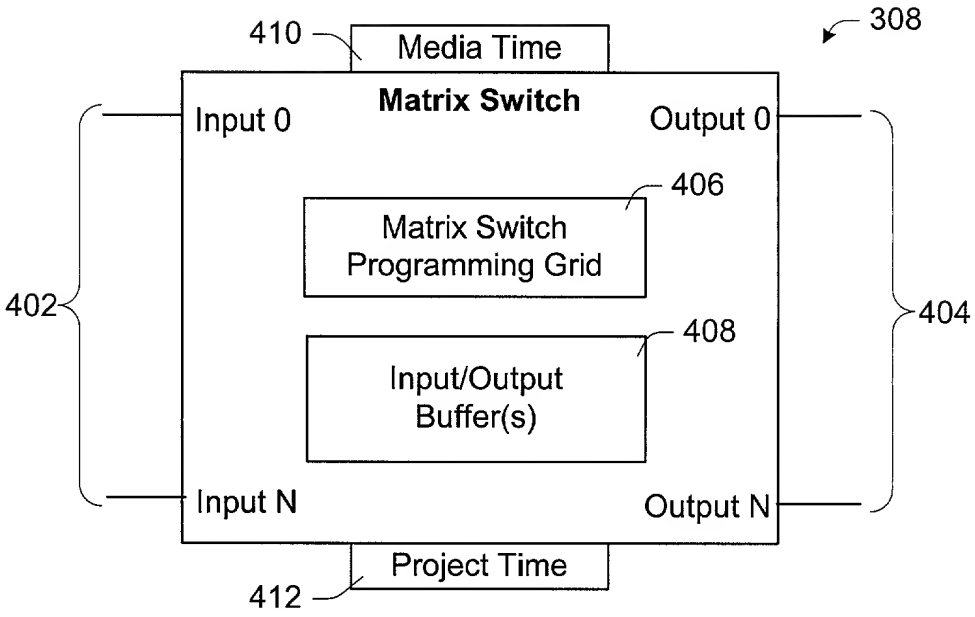

200
204
System Memory
208
(ROM)
BIOS
212
210
(RAM)
Operating System
214
Filter Graph Manager 222
Application Programs
216
Multimedia Application Program 224
Other Program Modules 218
Program Data
220
Processing Unit(s)
202
206
Bus
Video Adapter
244
Output Peripheral Interface
246
Network
248
LAN
251
WAN
252
Modem
254
A/V Source(s)
253
Input Interface(s)
242
Data Media Interfaces
226
228
230
232
234
236
238
240
Keyboard
250
Remote Applications
216
Operating System
214
Application Programs
216
Other Modules
218
Program Data
220

Fig. 2

Fig. 4


410
Media Time
308
Matrix Switch
Input 0
Output 0
406
Matrix Switch
Programming Grid
402
404
408
Input/Output
Buffer(s)
Input N
Output N
Project Time
412

SCANNED, #16

Fig. 5

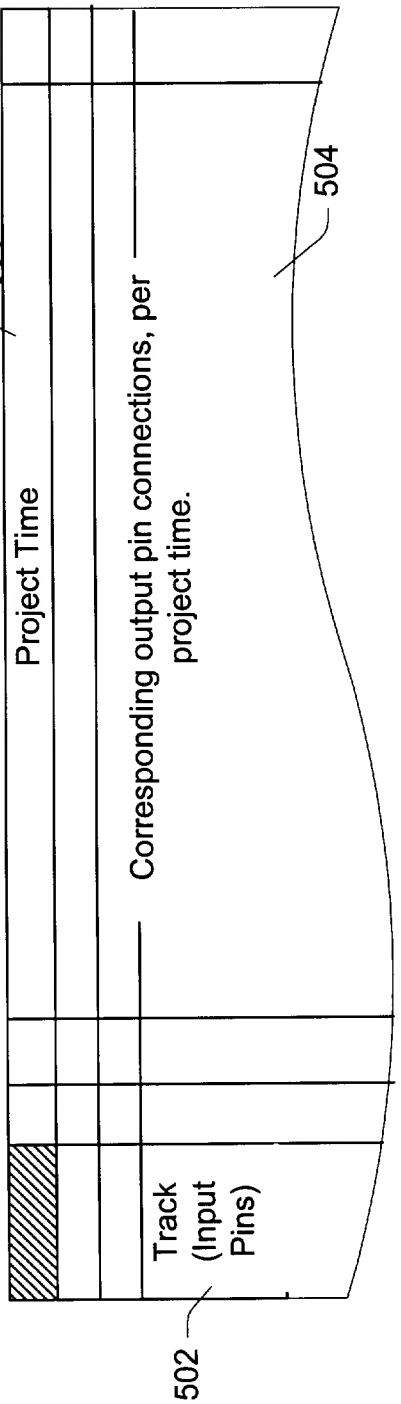


Fig. 6

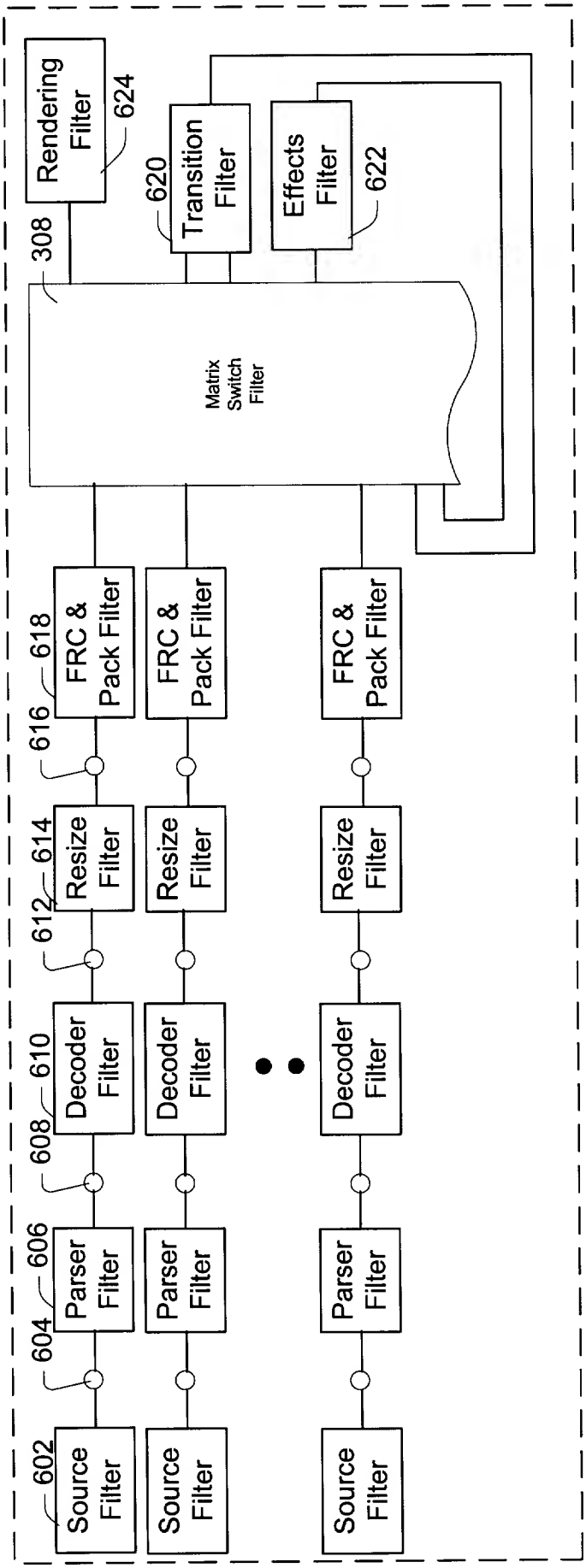


Fig. 7

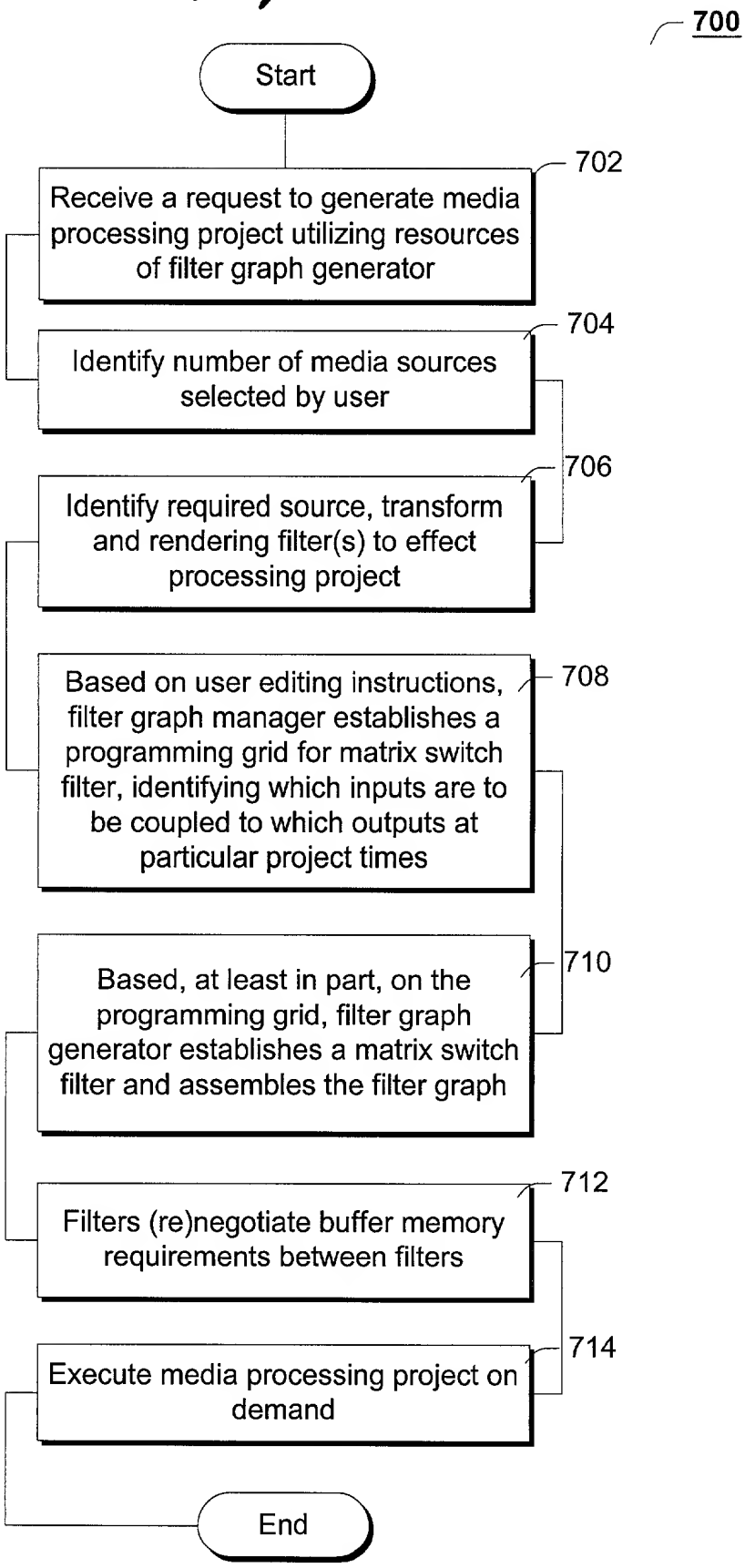
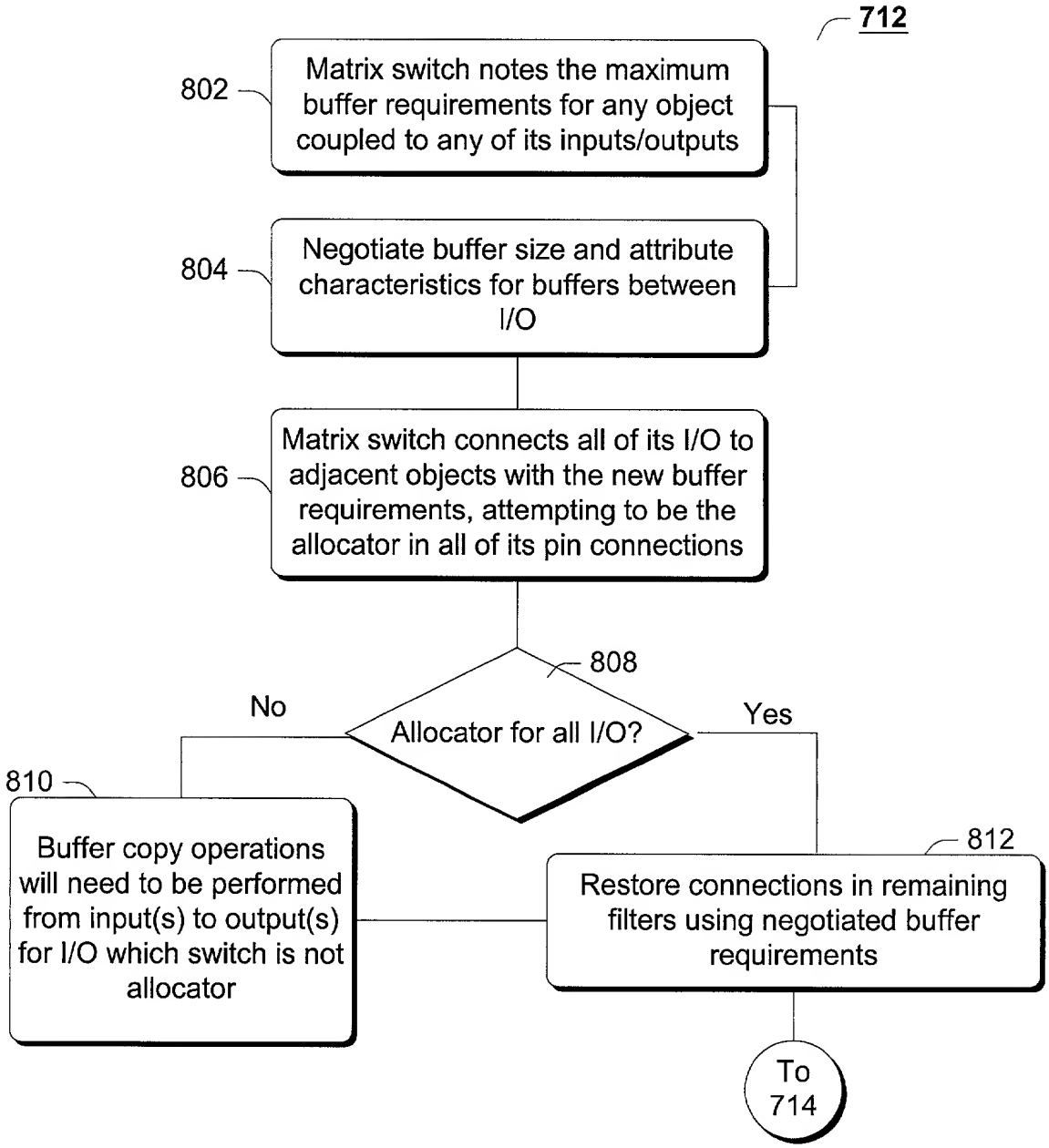

700
Start
Receive a request to generate media processing project utilizing resources of filter graph generator
702
Identify number of media sources selected by user
704
Identify required source, transform and rendering filter(s) to effect processing project
706
Based on user editing instructions, filter graph manager establishes a programming grid for matrix switch filter, identifying which inputs are to be coupled to which outputs at particular project times
708
Based, at least in part, on the programming grid, filter graph generator establishes a matrix switch filter and assembles the filter graph
710
Filters (re)negotiate buffer memory requirements between filters
712
Execute media processing project on demand
714
End

Fig. 8


712
802
Matrix switch notes the maximum buffer requirements for any object coupled to any of its inputs/outputs
804
Negotiate buffer size and attribute characteristics for buffers between I/O
806
Matrix switch connects all of its I/O to adjacent objects with the new buffer requirements, attempting to be the allocator in all of its pin connections
808
Allocator for all I/O?
No
Yes
810
Buffer copy operations will need to be performed from input(s) to output(s) for I/O which switch is not allocator
812
Restore connections in remaining filters using negotiated buffer requirements
To 714

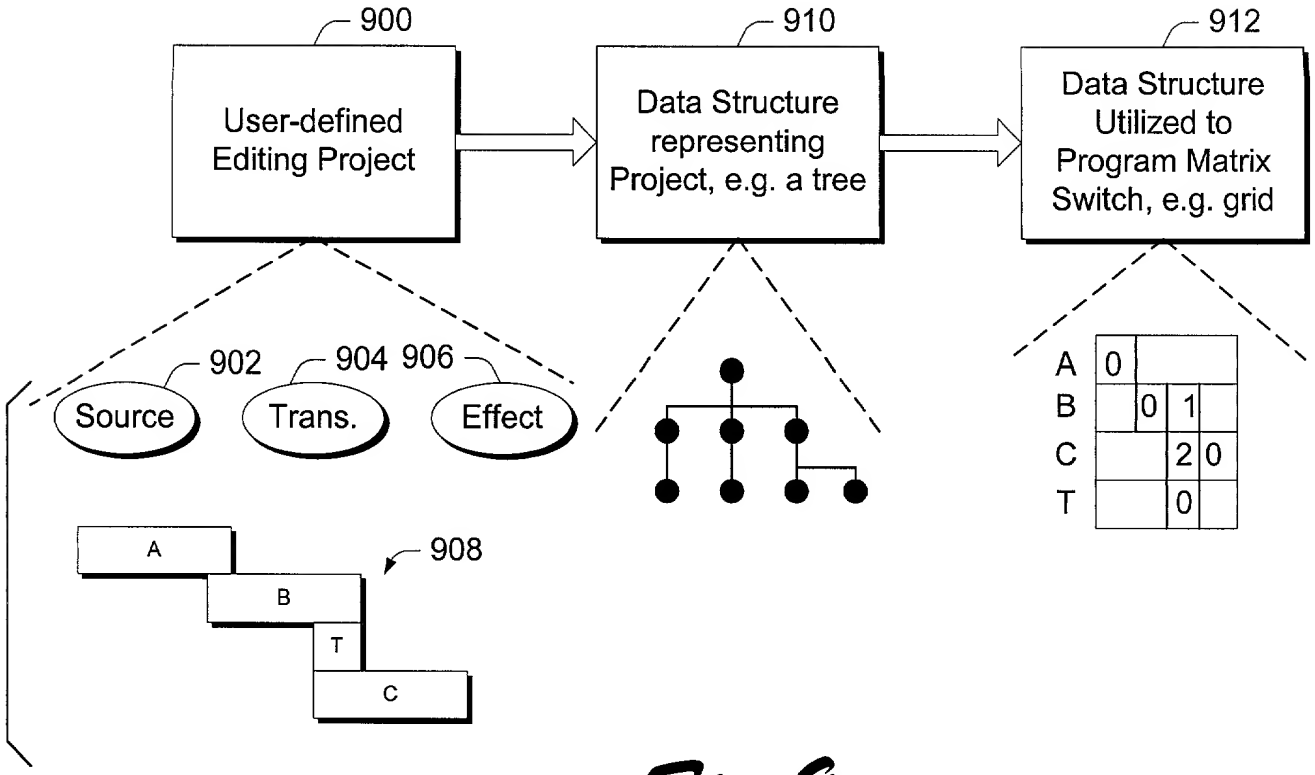

900
User-defined Editing Project
910
Data Structure representing Project, e.g. a tree
912
Data Structure Utilized to Program Matrix Switch, e.g. grid
902
904
906
Source
Trans.
Effect
A
B
T
C
908
A 0
B 0 1
C 2 0
T 0

Fig. 9

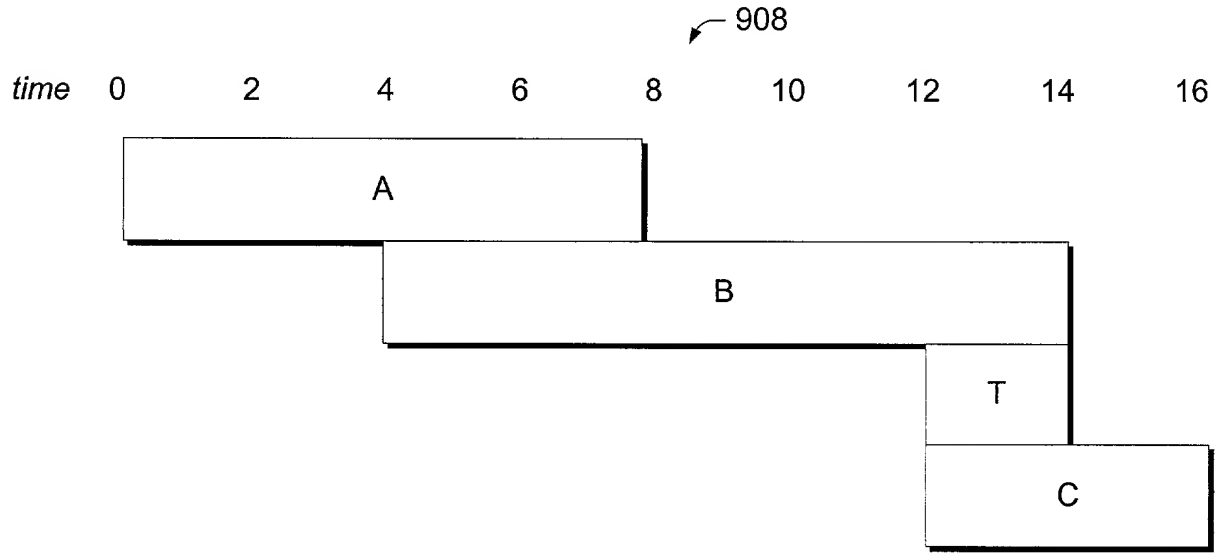

908
time 0 2 4 6 8 10 12 14 16
A
B
T
C

Fig. 10

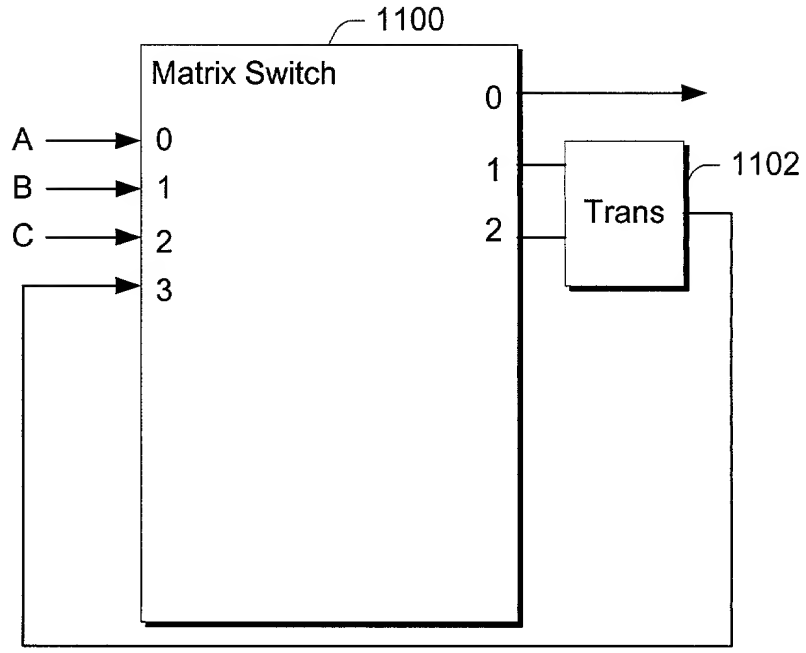

1100
Matrix Switch
A
B
C
0
1
2
3
0
1
2
Trans
1102

Fig. 11

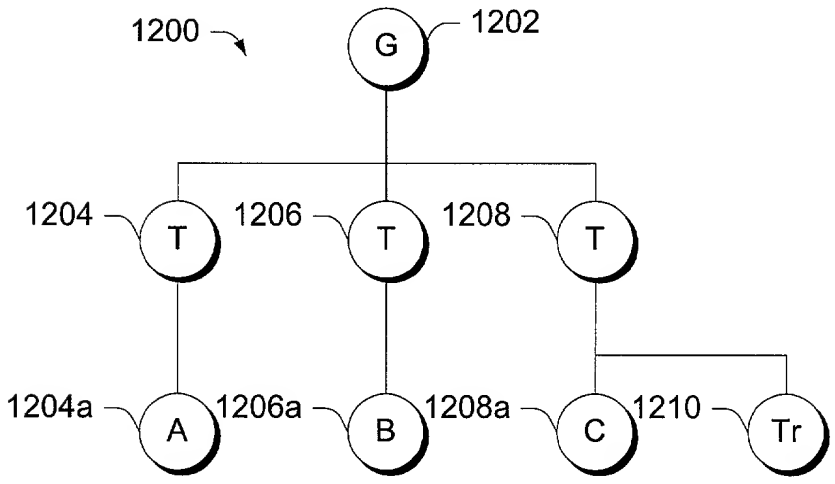

1200
G
1202
1204
T
1206
T
1208
T
1204a
A
1206a
B
1208a
C
1210
Tr

Fig. 12

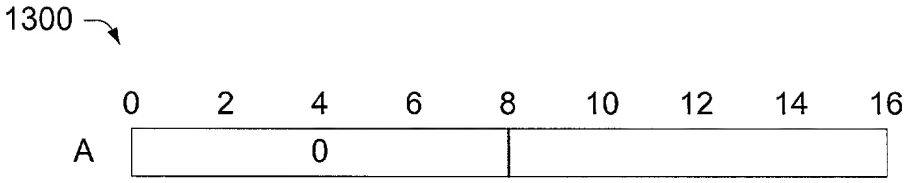


Fig. 13

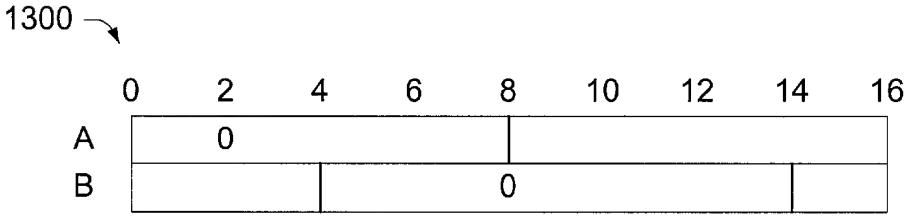


Fig. 14

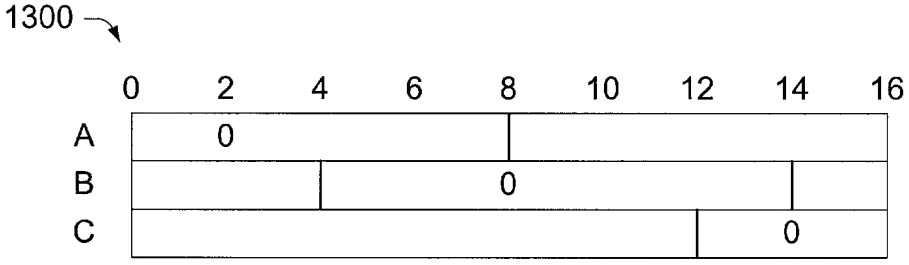


Fig. 15

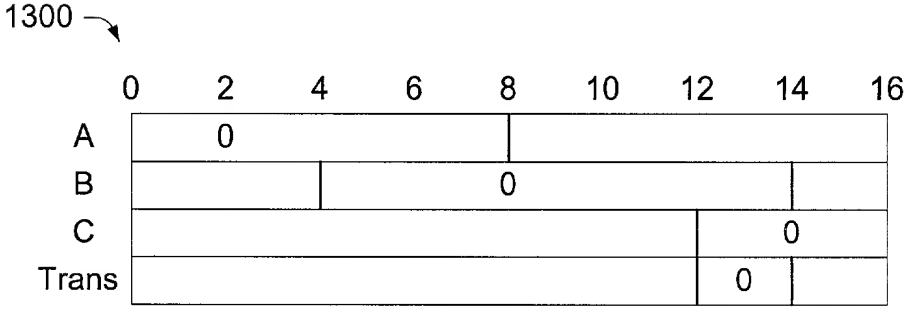


Fig. 16

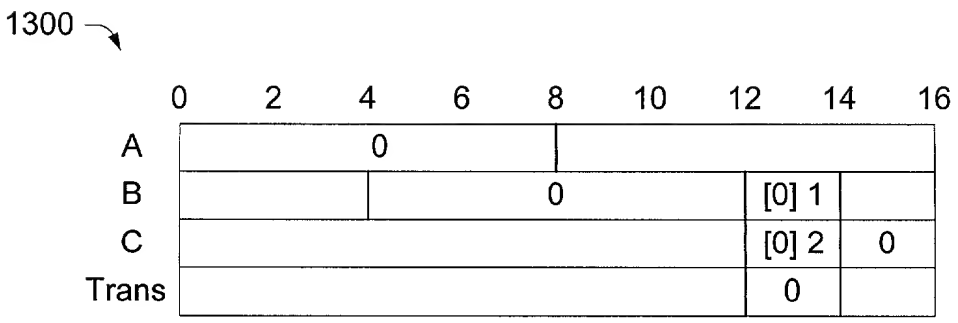

1300
0 2 4 6 8 10 12 14 16
A
B
C
Trans
0
0
[0] 1
[0] 2
0
0

Fig. 17

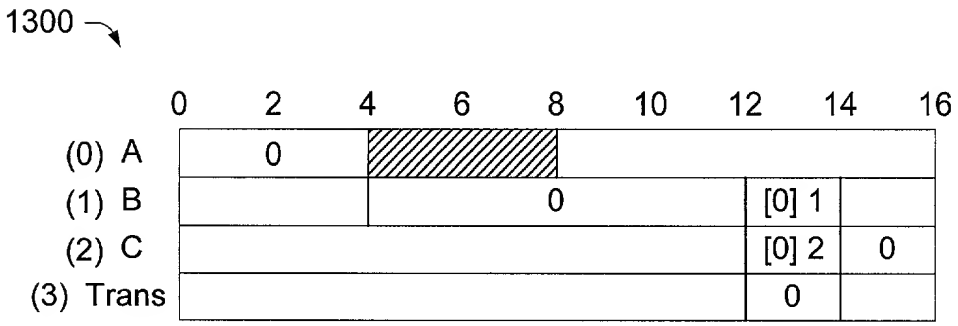

1300
0 2 4 6 8 10 12 14 16
(0) A
(1) B
(2) C
(3) Trans
0
0
[0] 1
[0] 2
0
0

Fig. 18

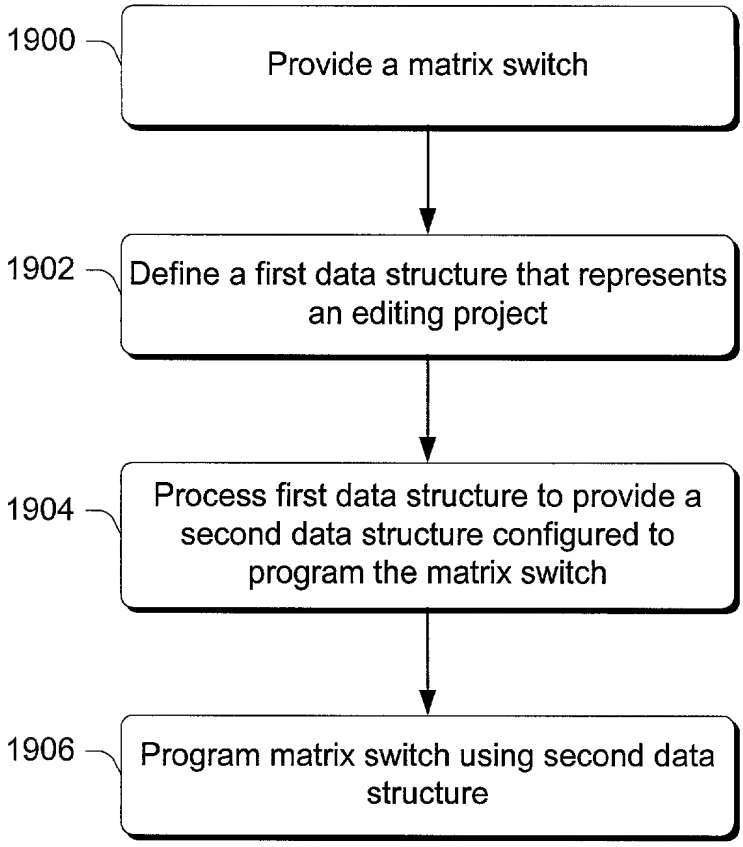

1900
Provide a matrix switch
1902
Define a first data structure that represents an editing project
1904
Process first data structure to provide a second data structure configured to program the matrix switch
1906
Program matrix switch using second data structure

Fig. 19

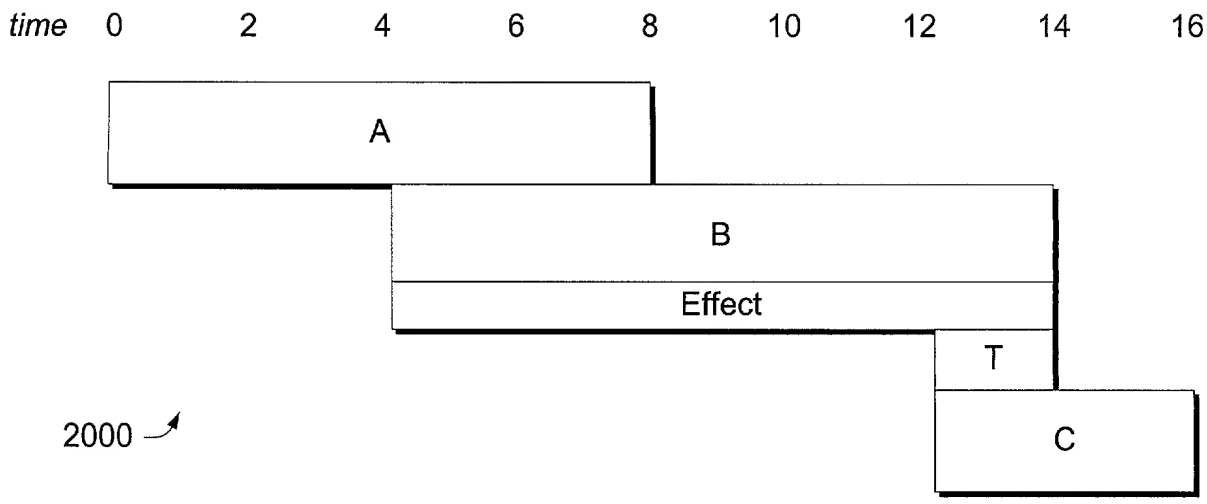


Fig. 20

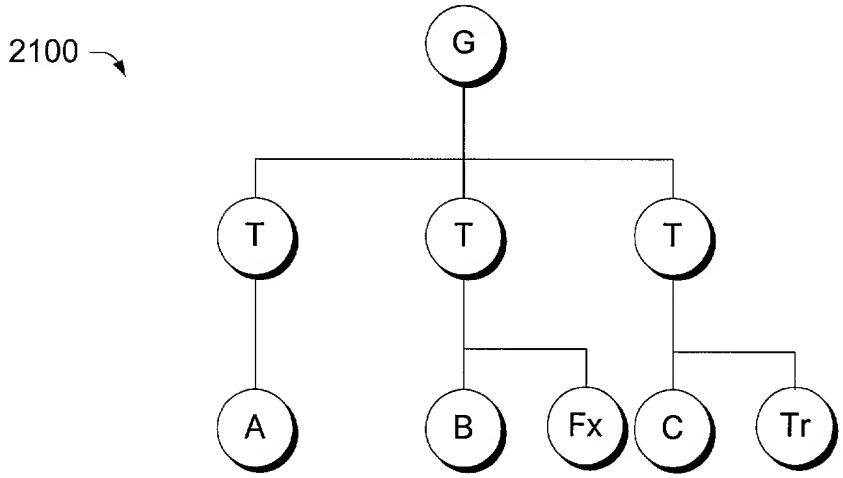


Fig. 21

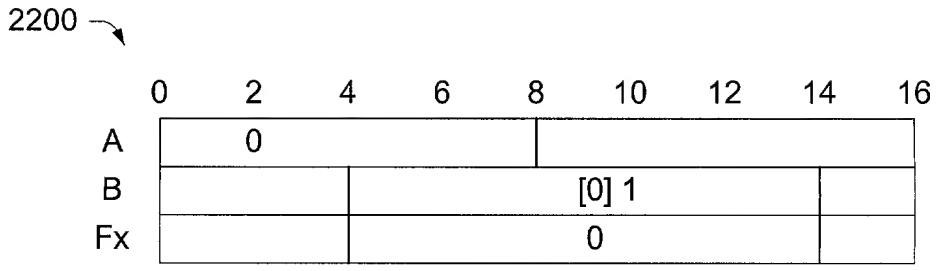


Fig. 22

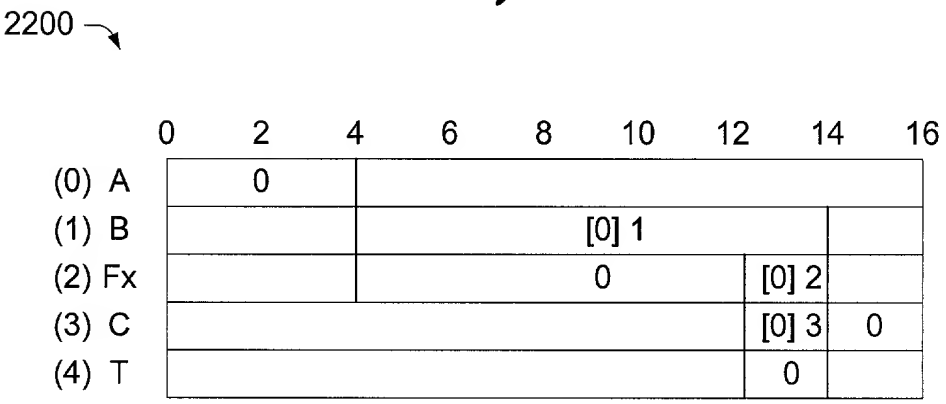


Fig. 23

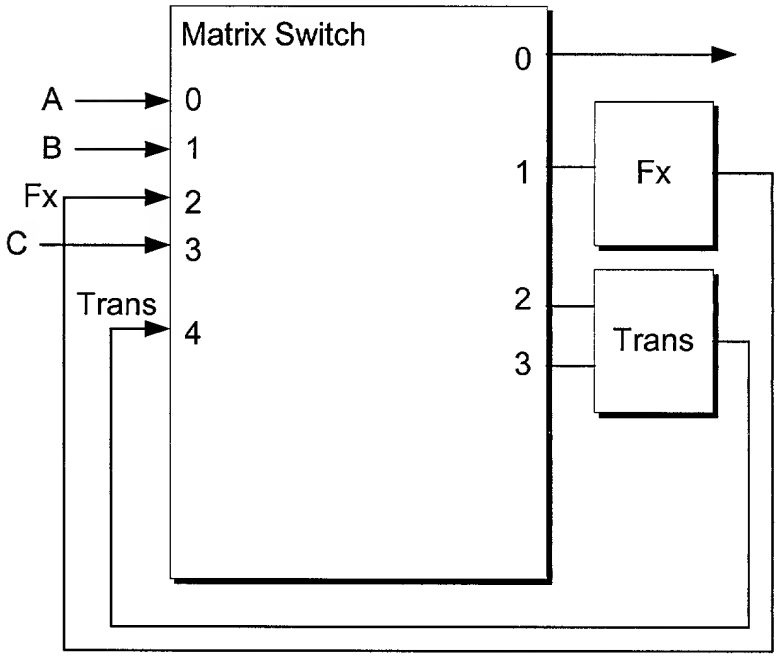


Fig. 24

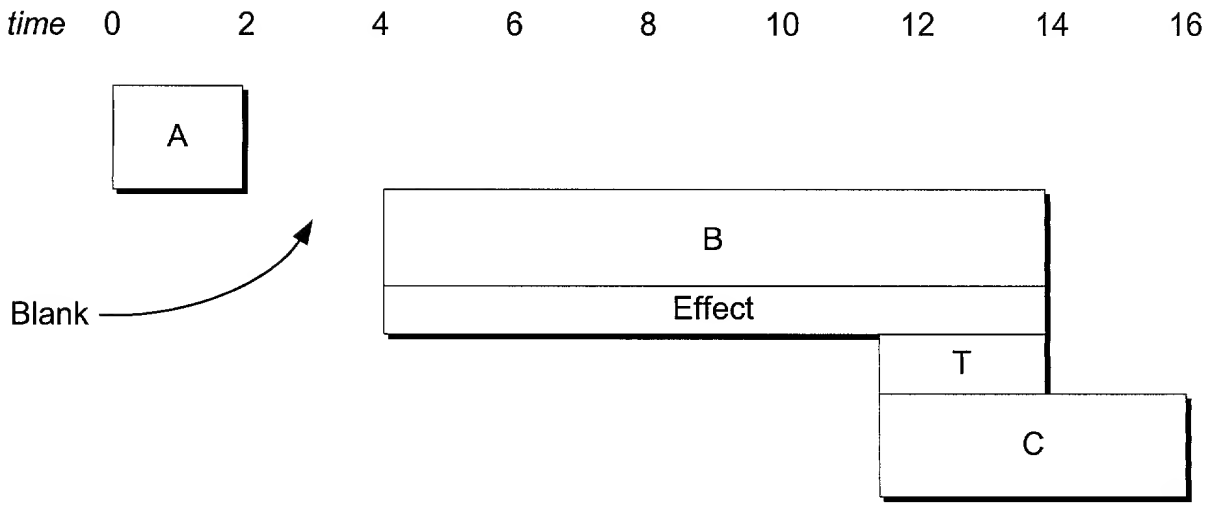

time
0
2
4
6
8
10
12
14
16
A
B
Effect
T
C
Blank

Fig. 25

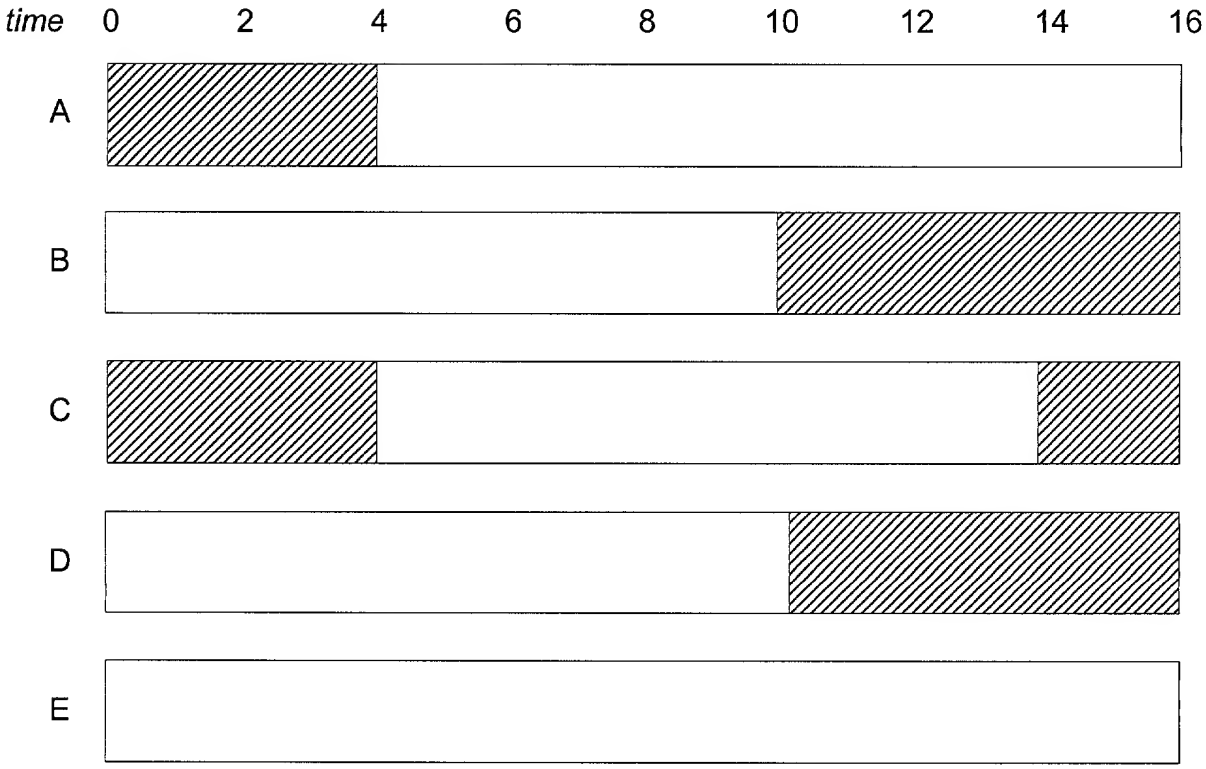

time
0
2
4
6
8
10
12
14
16
A
B
C
D
E

Fig. 26

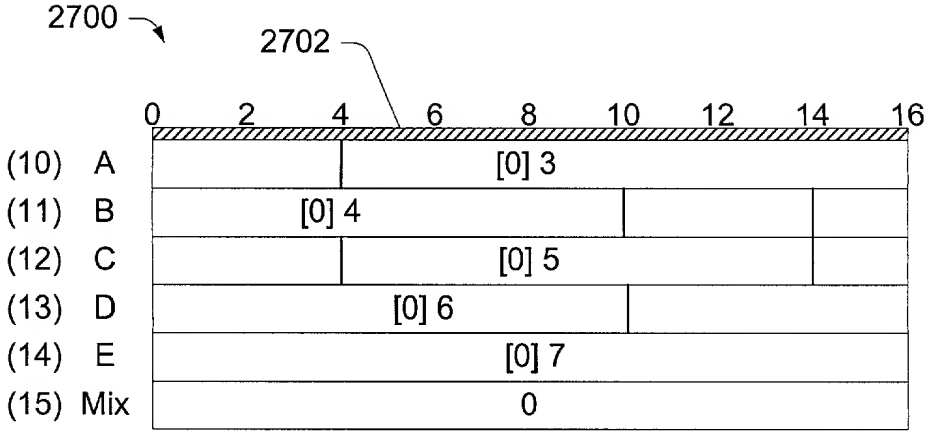

2700
2702
0 2 4 6 8 10 12 14 16
(10) A
(11) B
(12) C
(13) D
(14) E
(15) Mix
[0] 3
[0] 4
[0] 5
[0] 6
[0] 7
0

Fig. 27

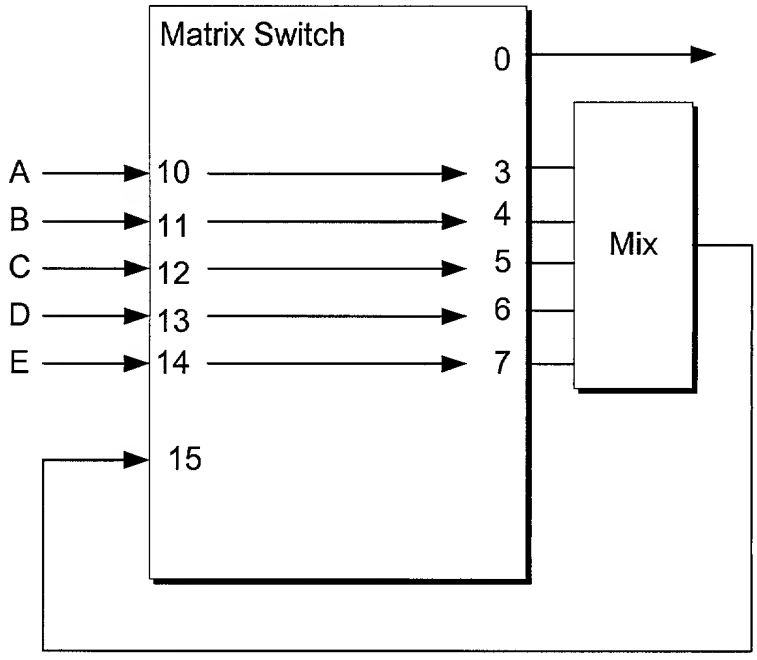

Matrix Switch
A
B
C
D
E
10
11
12
13
14
15
0
3
4
5
6
7
Mix

Fig. 28

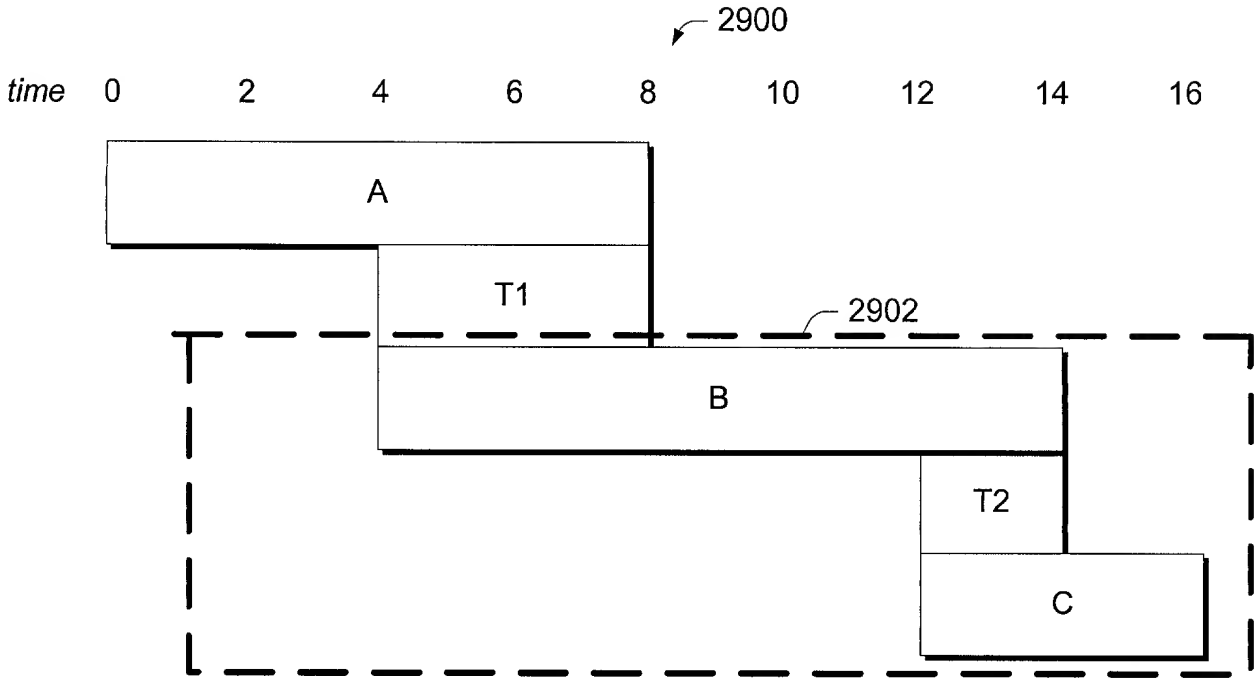

2900
time
0
2
4
6
8
10
12
14
16
A
T1
2902
B
T2
C

Fig. 29

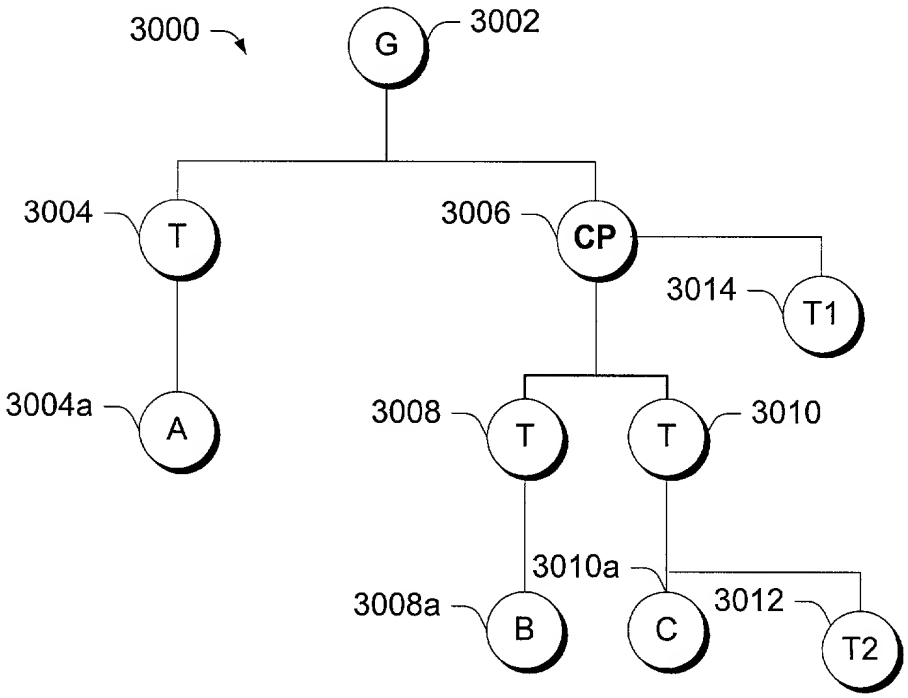

3000
G
3002
3004
T
3006
CP
3014
T1
3004a
A
3008
T
T
3010
3010a
3008a
B
C
3012
T2

Fig. 30

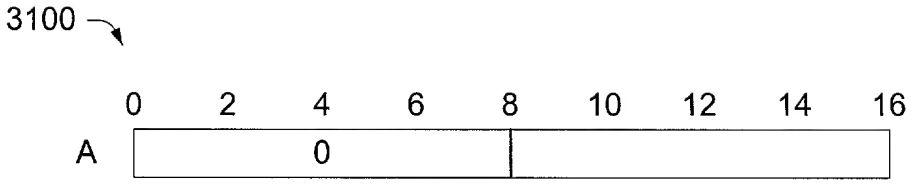


Fig. 31

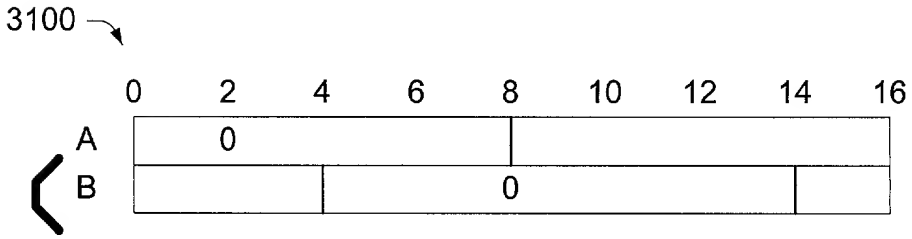


Fig. 32

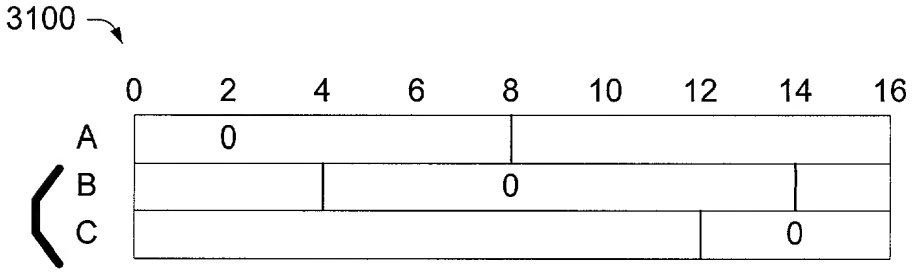


Fig. 33

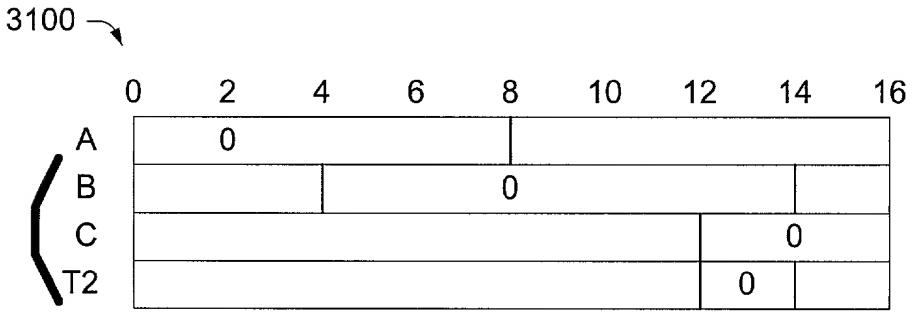


Fig. 34

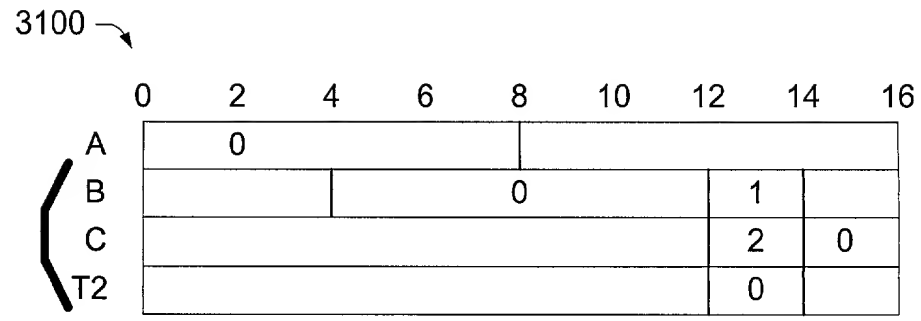


Fig. 35

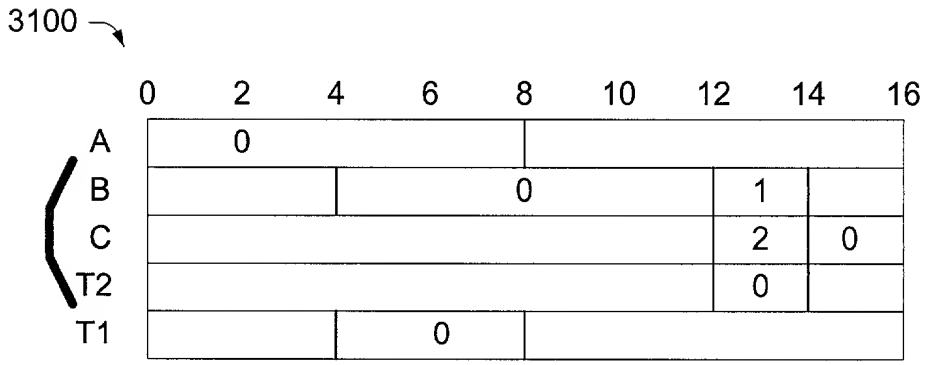


Fig. 36

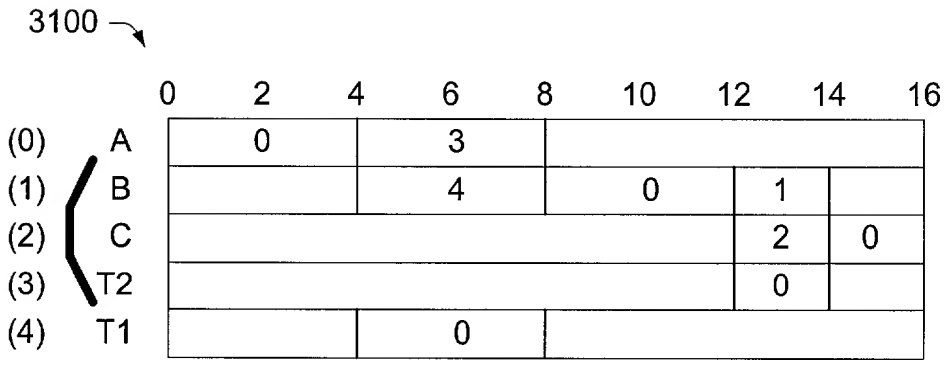


Fig. 37

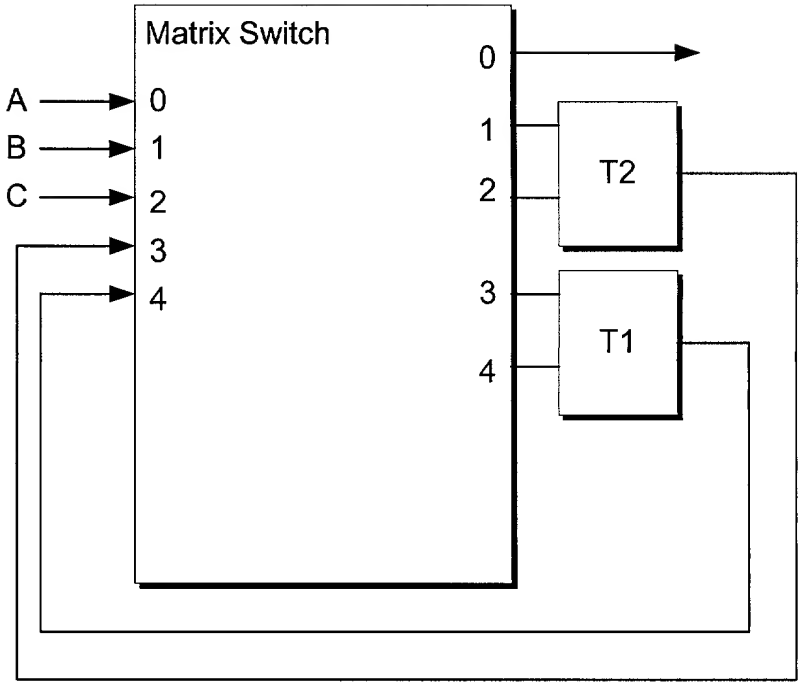


Fig. 38

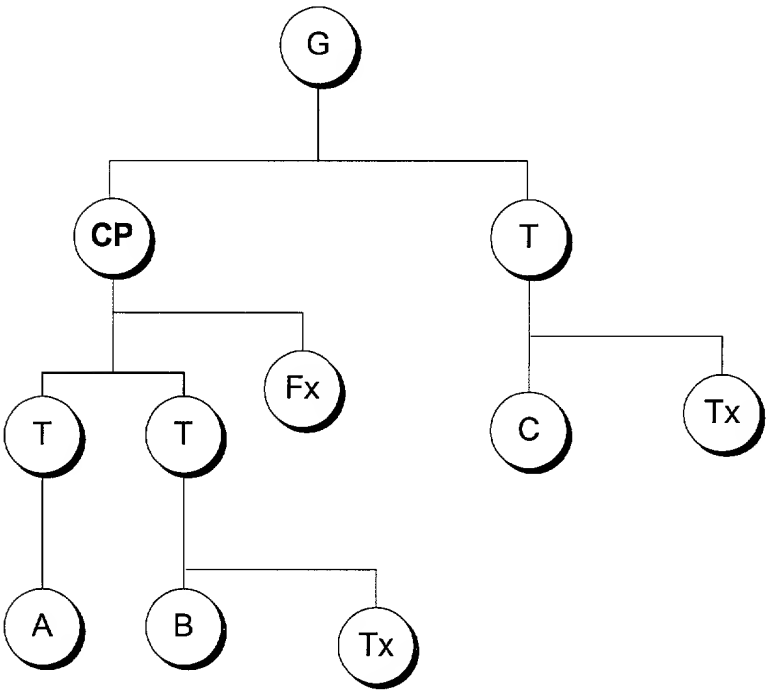


Fig. 38a

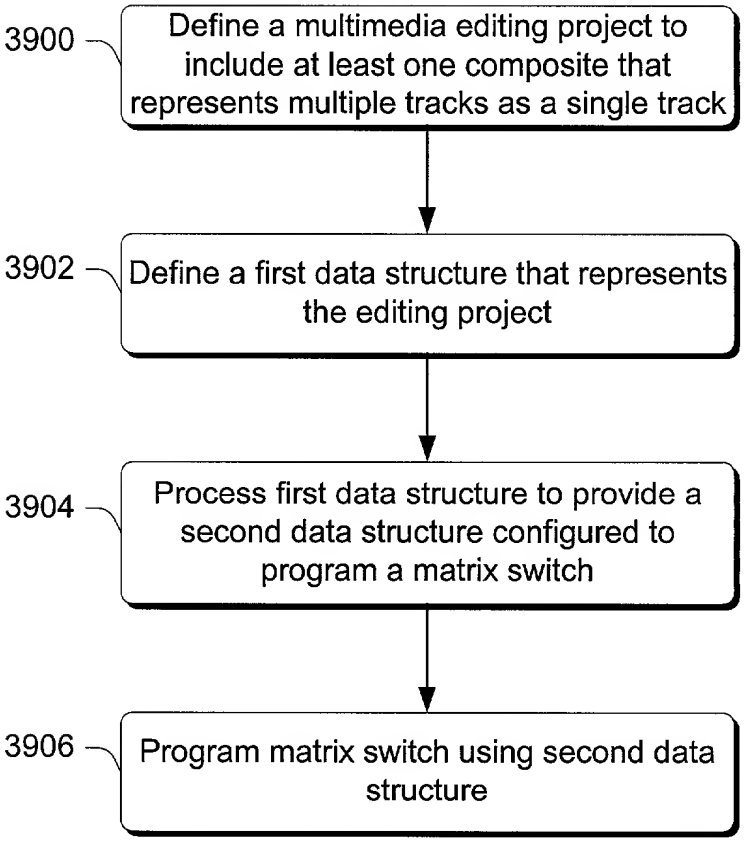

3900
Define a multimedia editing project to include at least one composite that represents multiple tracks as a single track
3902
Define a first data structure that represents the editing project
3904
Process first data structure to provide a second data structure configured to program a matrix switch
3906
Program matrix switch using second data structure

Fig. 39

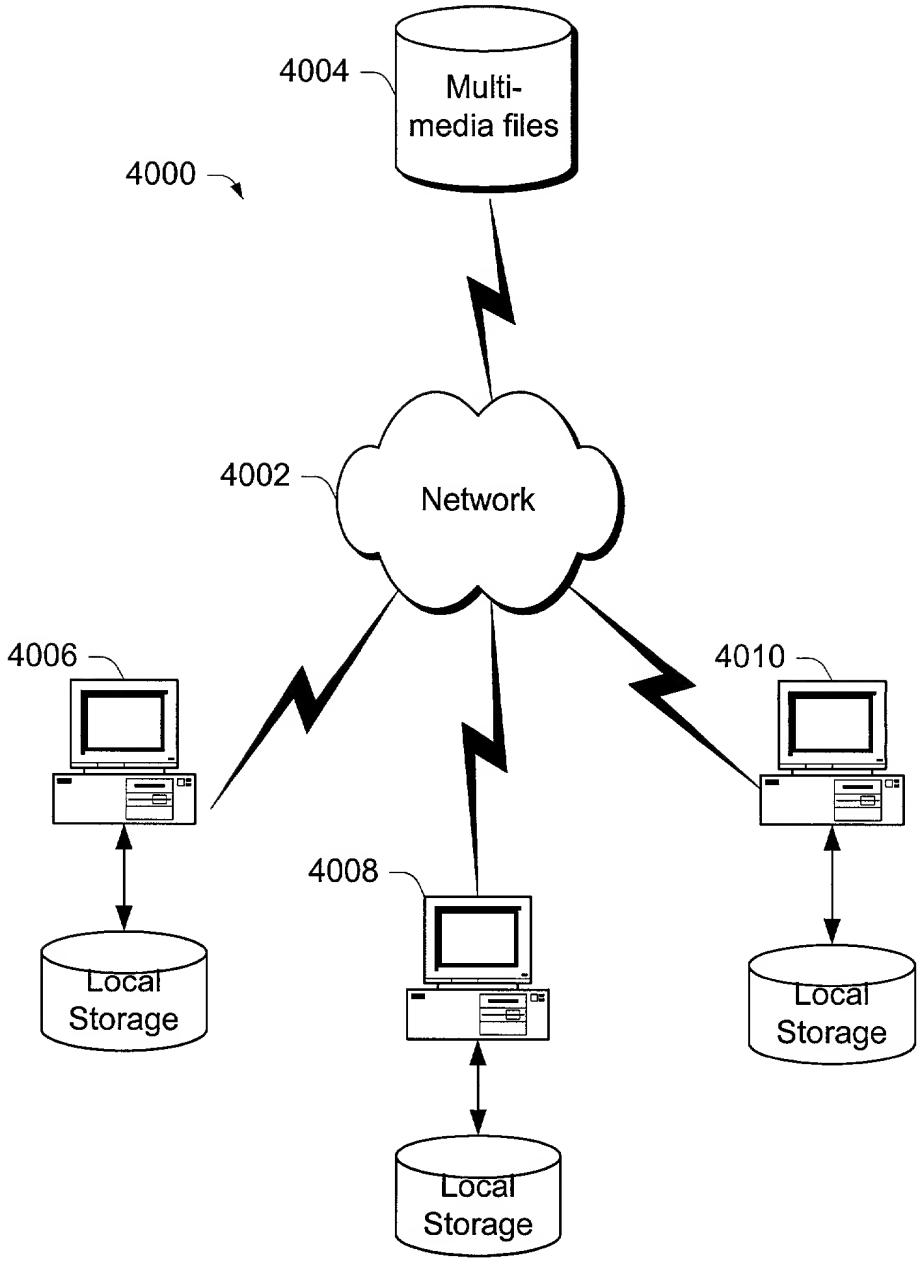

4004
Multi-media files
4000
4002
Network
4006
4010
4008
Local Storage
Local Storage
Local Storage

Fig. 40

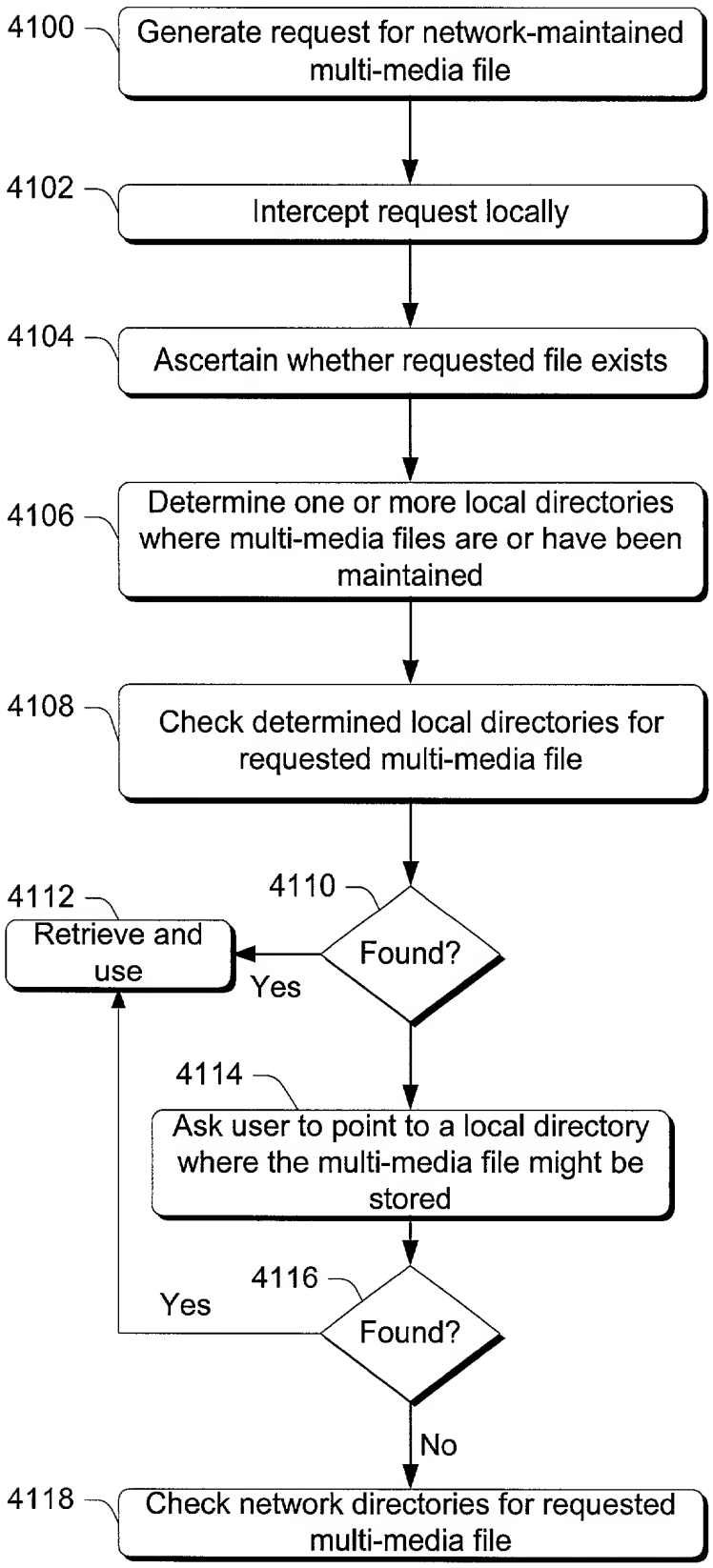

4100
Generate request for network-maintained multi-media file
4102
Intercept request locally
4104
Ascertain whether requested file exists
4106
Determine one or more local directories where multi-media files are or have been maintained
4108
Check determined local directories for requested multi-media file
4110
Found?
Yes
4112
Retrieve and use
4114
Ask user to point to a local directory where the multi-media file might be stored
4116
Found?
Yes
No
4118
Check network directories for requested multi-media file

Fig. 41

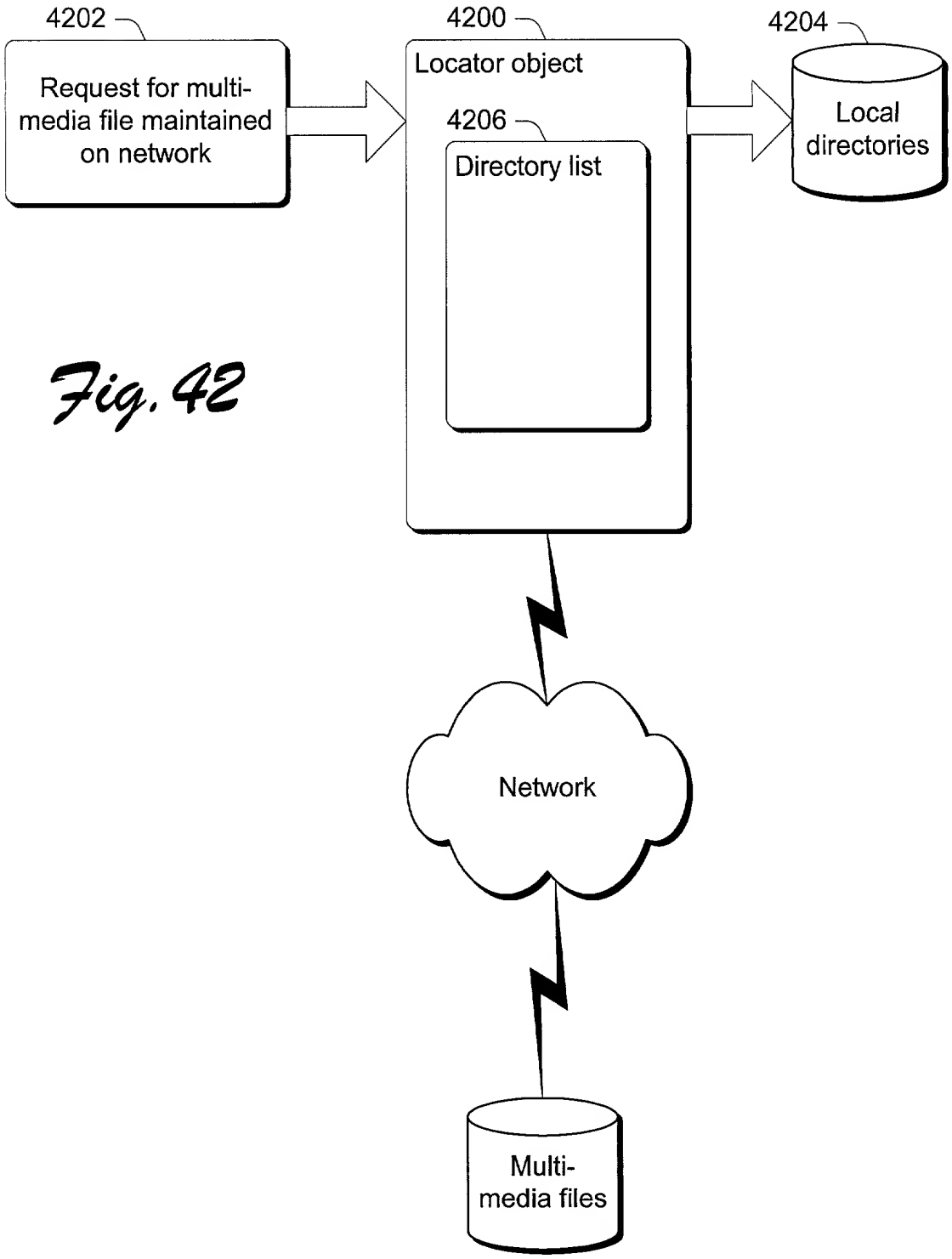

4202
Request for multi-media file maintained on network
4200
Locator object
4206
Directory list
4204
Local directories
Network
Multi-media files

Fig. 42